

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Withdrawn) A method of fabricating gate structures in a semiconductor device, the method comprising:

- forming a gate dielectric above a semiconductor body;
- forming a gate electrode above the gate dielectric;
- patterning the gate electrode to form a gate structure having a top and lateral sidewalls;
- nitriding the sidewalls of the gate structure; and
- forming a silicon nitride encapsulation layer along the sidewalls of the nitrided gate structure.

2. (Withdrawn) The method of claim 1, wherein forming the gate electrode comprises forming poly-silicon above the gate dielectric, and wherein nitriding the sidewalls of the gate structure comprises forming a first silicon nitride at a gate electrode portion of the sidewalls.

3. (Withdrawn) The method of claim 2, wherein forming the gate electrode further comprises forming metal, metal aluminide, or metal silicide above the gate dielectric, and wherein nitriding the sidewalls of the gate structure comprises forming a metal nitride at a gate electrode portion of the sidewalls.

4. (Withdrawn) The method of claim 3, wherein forming the metal or metal silicide comprises forming a nitrided metal, metal aluminum nitride, or metal silicon nitride above the gate dielectric, and wherein nitriding the sidewalls of the gate structure comprises fixing a stoichiometry of the nitrided metal, metal aluminum nitride, or metal silicon nitride by renitriding the nitrided metal or nitrided metal silicide at a gate electrode portion of the sidewalls.

5. (Withdrawn) The method of claim 4, wherein forming the gate dielectric comprises forming a nitrided dielectric above the semiconductor body, and wherein nitriding the sidewalls of the gate structure comprises fixing a stoichiometry of the nitrided dielectric by renitriding the nitrided dielectric at a gate dielectric portion of the sidewalls.

6. (Withdrawn) The method of claim 5, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia.

7. (Withdrawn) The method of claim 6, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia at a temperature of less than about 1000 degrees C.

8. (Withdrawn) The method of claim 5, wherein nitriding the sidewalls of the gate structure comprises performing plasma nitridation by a DPN or SPA nitridation process.

9. (Withdrawn) The method of claim 3, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia.

10. (Withdrawn) The method of claim 9, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia at a temperature of less than about 1000 degrees C.

11. (Withdrawn) The method of claim 3, wherein nitriding the sidewalls of the gate structure comprises performing plasma nitridation by a DPN or SPA nitridation process.

12. (Withdrawn) The method of claim 3, wherein forming the gate dielectric comprises forming a nitrided dielectric above the semiconductor body, and wherein nitriding the sidewalls of the gate structure comprises fixing a stoichiometry of the nitrided dielectric by renitriding the nitrided dielectric at a gate dielectric portion of the sidewalls.

13. (Withdrawn) The method of claim 2, wherein forming the gate dielectric comprises forming a nitrided dielectric above the semiconductor body, and wherein nitriding the sidewalls of the gate structure comprises fixing a stoichiometry of the nitrided dielectric by renitriding the nitrided dielectric at a gate dielectric portion of the sidewalls.

14. (Withdrawn) The method of claim 2, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia.

15. (Withdrawn) The method of claim 14, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia at a temperature of less than about 1000 degrees C.

16. (Withdrawn) The method of claim 2, wherein nitriding the sidewalls of the gate structure comprises performing plasma nitridation by a DPN or SPA nitridation process.

17. (Withdrawn) The method of claim 1, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia.

18. (Withdrawn) The method of claim 17, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia at a temperature of less than about 1000 degrees C.

19. (Withdrawn) The method of claim 17, wherein forming the silicon nitride encapsulation layer comprises exposing the sidewalls to ammonia and silane.

20. (Withdrawn) The method of claim 1, wherein nitriding the sidewalls of the gate structure comprises performing plasma nitridation by a DPN or SPA nitridation process.

21. (Withdrawn) The method of claim 1, wherein forming the gate dielectric comprises forming a nitrided dielectric above the semiconductor body, and wherein nitriding the sidewalls of the gate structure comprises fixing a stoichiometry of the nitrided dielectric by renitriding the nitrided dielectric at a gate dielectric portion of the sidewalls.

22. (Withdrawn) The method of claim 1, wherein forming the gate electrode comprises forming metal, metal aluminide, or metal silicide above the gate dielectric, and wherein nitriding the sidewalls of the gate structure comprises forming a metal nitride at a gate electrode portion of the sidewalls.

23. (Withdrawn) The method of claim 1, wherein forming the gate electrode comprises forming a nitrided metal, metal aluminum nitride, or metal silicon nitride above the gate dielectric, and wherein nitriding the sidewalls of the gate structure comprises fixing a stoichiometry of the nitrided metal, metal aluminum nitride, or metal silicon nitride by renitriding the nitrided metal, metal aluminum nitride, or metal silicon nitride at a gate electrode portion of the sidewalls.

24. (Withdrawn) The method of claim 1, wherein forming the silicon nitride encapsulation layer comprises exposing the sidewalls to ammonia and silane.

25. (Withdrawn) The method of claim 24, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia.

26. (Withdrawn) The method of claim 25, wherein nitriding the sidewalls of the gate structure comprises exposing the sidewalls to ammonia at a temperature of less than about 1000 degrees C.

27. (Withdrawn) The method of claim 24, wherein forming the silicon nitride encapsulation layer comprises exposing the sidewalls to ammonia and silane.

28. (Withdrawn) The method of claim 1, wherein nitriding the sidewalls is done after patterning the gate electrode and before forming the silicon nitride encapsulation layer.

29. (Withdrawn) A method of encapsulating a patterned transistor gate structure, the method comprising:

nitriding sidewalls of a patterned gate structure; and

forming a silicon nitride encapsulation layer along the sidewalls of the nitrided gate structure.

30. (Original) A transistor gate structure, comprising:

a gate dielectric formed above a semiconductor body, the gate dielectric comprising a gate dielectric sidewall;

a gate electrode above the gate dielectric, the gate electrode comprising a gate electrode sidewall;

a silicon nitride encapsulation layer laterally spaced from the gate dielectric sidewall and spaced from the gate electrode sidewall;

a nitrided dielectric between the silicon nitride encapsulation layer and the gate dielectric sidewall; and

a nitrided material between the silicon nitride encapsulation layer and the gate electrode sidewall.

31. (Original) The gate structure of claim 30, wherein the gate electrode comprises poly-silicon, and wherein the nitrided material comprises silicon nitride between the silicon nitride encapsulation layer and the gate electrode sidewall.

32. (Currently Amended) The gate structure of claim 31, wherein the gate electrode further comprises metal, metal aluminide, or metal silicide, and wherein the nitrided material further comprises nitrided metal, metal aluminum nitride, or metal silicon nitride between the silicon nitride encapsulation layer and the gate electrode sidewall.

33. (Currently Amended) The gate structure of claim 30, wherein the gate electrode comprises metal or metal silicide, and wherein the nitrided material comprises nitrided metal, metal aluminum nitride, or metal silicon nitride between the silicon nitride encapsulation layer and the gate electrode sidewall.

34. (Original) An encapsulation structure for conditioning and protecting a transistor gate structure having a gate dielectric and a gate electrode, the encapsulation structure comprising:

a silicon nitride encapsulation layer laterally spaced from a sidewall of the gate structure;

a nitrided dielectric between the silicon nitride encapsulation layer and the gate dielectric at the sidewall; and

a nitrided material between the silicon nitride encapsulation layer and the gate electrode at the sidewall.